EXHIBIT 15

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

JOANNE HART and SANDRA BUENO, on behalf of themselves and all others similarly situated, Plaintiffs, v. BHH, LLC d/b/a Bell + Howell and VAN HAUSER LLC Defendants.	Civil Action No. 1:15-CV-04804-WHP

REBUTTAL REPORT OF DR. MICHAEL F. POTTER

Dated: December 22, 2017

TABLE OF CONTENTS

Page(s)

I. INTRODUCTION

1. I have been asked to provide this rebuttal report on behalf of Plaintiffs in response to the expert reports of Dr. Paul W. Borth and Dr. Philip Whitford in the certified class action *Hart, et al. v. BHH, LLC d/b/a Bell + Howell, et al.*

2. Based on my review, I have determined that the findings and conclusions of the Borth and Whitford reports are flawed and incorrect.

II. DATA AND OTHER INFORMATION CONSIDERED

3. A list of documents that I have considered in preparing my rebuttal report is attached hereto as Appendix 1. This list does not include documents already cited in my initial report.

4. I am also relying on my experience and knowledge accumulated in my years of work as a practicing urban entomologist, pest management expert, educator and researcher.

5. My statement of qualifications is unchanged since submission of my initial report on October 31, 2017.

III. COMPENSATION

6. I am being compensated for my work as an expert in this case at a rate of $375 per hour. My compensation is in no way dependent on the outcome of this case.

IV. ANALYSIS OF THE BORTH REPORT

7. I reviewed the expert report of Dr. Paul Borth in this case. Dr. Borth opines that the Bell + Howell devices perform as advertised to repel cockroaches, spiders and ants when used in accordance with instructions. As explained below, his assumptions and interpretations are flawed and do not support his conclusions.

A. Dr. Borth's Reliance on Ballard et al. (1984) Is Improper

8. Under a section labeled as "Opinion 3," Dr. Borth argues that the findings of Ballard et al. (1984) are "germane" to this case because the devices studied had comparable characteristics to those of Bell + Howell repellers, i.e. sweeping frequency levels and loudness (Borth Report at 6-7).

9. I agree with Dr. Borth that the findings of studies testing the efficacy of devices using ultrasonic sound with comparable loudness and frequency levels can be used to form opinions regarding the effectiveness (or ineffectiveness) of the Bell + Howell devices. However, I disagree with his opinion that any such conclusions can be reliably drawn from the Ballard et al. (1984) study.

10. Dr. Borth highlights the study finding that increased initial movement of confined German cockroaches occurred in the presence of an ultrasound-emitting device. However, he neglects to mention that when the experiment was repeated using an improved design, no such effect was observed on days 6 and 7, suggesting habituation to the device. The investigators concluded that while the use of ultrasound in this particular experiment slightly increased activity/locomotion of German cockroaches, "the biological importance of these observations is difficult to interpret" and "there was no evidence that either control or repulsion of German cockroach populations occurred as a result of ultrasound" (Ballard et al. 1984; Gold et al. 1984).

11. Dr. Borth also neglects to mention the numerous other studies on cockroaches that found no biologically important effect from ultrasound (Ballard and Gold 1982, 1983; Gold et al. 1984; Schreck et al. 1984; Koehler et al. 1986; Decker et al. 1989; Gold 1995; Huang and Subramanyam 2006; Ahmad et al. 2007). Among these was a parallel study authored by Ballard's major professor, Dr. Roger Gold. In this case, the investigators concluded: "Claims that these ultrasonic devices are effective in controlling, repelling, or eliminating roaches and

waterbugs are unfounded based on the results of this research… At best, cockroaches could possibly be moved to sound shadows within a residence, but this should not be considered control because the same population would still exist within the confines of the defined environment. Available scientific evidence thus indicates that ultrasound cannot be used effectively to control German cockroaches" (Gold et al. 1984). Each of the aforementioned studies employed ultrasonic devices with similar frequencies, amplitudes, and sound variances as the Bell + Howell devices.

B. Efficacy Studies Commissioned By The Defendants Are Flawed And Unreliable

12. Dr. Borth concludes that Bell + Howell Repellers are "efficacious" based on the conditions that were used in "five choice experiments" commissioned by Defendants (Borth Report at 8). But as I discussed in Section X of my October 31, 2017 report, these flawed experiments yield false conclusions. Simply put, these experiments are completely unreliable to support Dr. Borth's conclusions. Below, I explain in more detail the flaws of each of the five choice experiments upon which Dr. Borth relies.[1]

1. QMANN REPORT # 10275-1

13. As with all tests commissioned by Defendants, no replication, randomization, or untreated experimental controls were included in the design, making it hard to know whether observed differences were real or random. Statistical analysis of data subsequently performed by Dr. Borth also was flawed and will be discussed in Section IV C. of this report.

14. Another design flaw negating results of this experiment was the confounding effect caused by releasing mice, spiders, and cockroaches into the same set of rooms at the same

[1] Dr. Borth examined a sixth report as well, but determined that it was statistically "disqualified" (Borth Chi Sq. report at 30).

time. Since mice readily consume cockroaches and spiders, and some spiders prey upon roaches, perceived repellency could have been from avoiding predators or pursuing prey, rather than from the Bell + Howell device.

15. Another serious problem is the studies failure to note which species of cockroaches, spiders, and mice were being tested. Cockroaches, spiders, and mice are each diverse taxa, with thousands of different species occurring worldwide. The lack of species specification in this and all other tests makes the study irreproducible by other researchers and thus unscientific.

16. Photos accompanying the test report indicate that white laboratory mice were used in the experiment. Years of inbreeding have radically changed lab-reared mice from their wild ancestors, causing them to have far different physiology and behavior. Consequently, such animals should never be used to evaluate or predict performance of pest control products.

17. Investigators assert that any pests that "stayed" in a chamber/area without a device were considered repelled, while any remaining in chambers/areas with a device were not repelled. They based this assumption on a visual count taken once per day. However, daily measurement of food and water consumed suggested sustained movement of pests between chambers with and without a device. In this particular experiment, the reduction in total food weight during the activation period was numerically *higher* in the room with the repeller (Room 3; 1.9 ounces), than in four of the five other interconnected Rooms 1, 2, 4 and 5 without the repeller — 1.7, 1.7, 0.9, and 1.1 ounces, respectively. (The remaining room (6) without the repeller had a total food weight loss of 2.1 ounce.) The fact that these declines occurred even on days when no pests were observed in the chamber with the device suggests such movements may have been occurring at night.

18. Accompanying photos further show that test rooms were empty and devoid of nesting or harborage sites for the mice, cockroaches and spiders. All of these animals have cryptic behaviors, which may be altered when confined in enclosures with no protective harborage. Additional flaws pertaining to conduct of this experiment are mentioned in Section X of my October 31, 2017 report.

2. QMANN REPORT 10275-2

19. This trial was conducted in much the same manner as the previous one, although two adjoining rooms were used rather than six. Virtually all of the same design flaws (no replication, no untreated controls, joint evaluation of pest taxa, etc.) noted for the previous experiment apply to this one as well. Insufficient numbers of test organisms, e.g., only 6 spiders included in the entire experiment, compounded further by loss or death (possibly from predation), resulted in approximately half the original cohort of spiders and 20 percent of cockroaches being replaced before testing began. The fact that the two rooms differed in size and other characteristics, e.g., presence of exit area, further complicates the statistical analysis performed by Borth (see Section IV C).

3. SGS REPORT # SZXWT00603439

20. The setup for this trial consisted of two plastic 4 (L) x 4 (W) x 1.5 (H) foot chambers connected by a curved plastic tunnel. The device was placed into one chamber to assess whether pests were repelled to the other.

21. Most of the design flaws mentioned for the previous trials apply to this one as well. Homes and buildings are much more complex environments than the simple enclosure used in this experiment. Cockroaches, ants, and spiders seldom reside in open, unprotected spaces such as the confines of an empty plastic chamber. They prefer to dwell within cracks, crevices and voids of cabinets, pantries, closets, furniture, appliances, stored items, walls, floors,

baseboards, ceilings, attics, garages, basements, etc. Ultrasonic waves seldom reach such areas when used according to manufacturer instructions. User instructions accompanying Bell + Howell's pest repellers in fact advise that "Ultrasonic signals cannot reach nesting or feeding places behind walls, under floors, or within cracks" — the very places these pests tend to hide within homes and buildings.

22. If cockroaches, ants and spiders did happen to avoid the B+H devices as they seemingly did in this experiment, control still would be unlikely since the pests would simply relocate elsewhere in the dwelling. Using repellents indoors often makes pest problems worse since the displaced individuals often repopulate in harder to reach locations behind walls, floors, ceilings, clutter, etc. Some of the most challenging pest problems I have encountered were made worse by the use of repellent materials within buildings.

23. In this trial, investigators did recognize the need to test spiders independently to avoid conflicts with the ants and roaches. However, initial attempts to feed the spiders a diet of bread and granulated sugar raises other troubling questions about the aptitude of those performing the study. Virtually all of the spiders, ants, and cockroaches were recorded in the chamber without the repeller one day after the device was turned on. Water consumption in the non-repeller chamber was higher as well — so high in fact as to raise questions. Many types of spiders, especially those adapted to living indoors, fulfill their moisture requirements from consuming prey rather than from free water (Foelix 2011). I found it curious that a cohort of 20 spiders of unknown variety would consume 40 to 70 milliliters of water each day as stated in the report. Also surprising was the daily reported water consumption (5-15 ml per day) in the test by only 20 ants and cockroaches.

4. Intertek Report # 140515021GXU-002

24. This trial had the same, paired interconnected cube arrangement where the device was placed into one chamber to assess whether pests were repelled to the other. (The actual Intertek Report # is 140515021G**Z**U-002.) Flaws in this experiment are much the same as in those discussed previously, e.g., no replication, randomization, experimental controls, artificial test environment. A seriously inadequate sample size (10 cockroaches, 10 ants, and 10 spiders, all released at the same time into the enclosures) further negated drawing meaningful conclusions from the test. When small numbers of organisms are used in such experiments, it is important to replicate (repeat) the trial many times (e.g., 10 or more replications). When there is potential for interaction between organisms (as in this experiment), multiple repetitions are that much more important.

5. Intertek Report # 160419051GZU-002

25. Flaws in this test are similar to those discussed previously (no replication, randomization, experimental controls, artificial test environment, etc.). On pages 4 and 6 of the test report there are statements indicating that "Any test pests that stay in the Chamber B (without ultrasonic pest repeller) and tunnel were counted as repelled, and "The quantity of tunnel was counted as chamber B." ." These statements are concerning since they assume pests observed anywhere in the 10-ft long adjoining tunnel were counted as being in chamber B and thus repelled due to the device. Considering their proximate location, this is an invalid assumption that skews the count in favor of a repellent effect. Since cockroaches, ants, and spiders innately prefer crevices and other confined spaces, organisms residing in the narrow confines of the tunnel may have been there for reasons other than effects of the device. If other studies also counted organisms within the tunnel as repelled it raises another troubling flaw in the conduct of these experiments. As discussed in Section X (84) of my October 31, 2017 report,

periodically adding new spiders, ants, roaches or rodents during this (and several other experiments) introduces another potential source of bias and negates the primary purpose of pre-treatment monitoring— to allow test animals to acclimate to their new surroundings and establish a baseline compared to with the activated device.

C. Dr. Borth's Chi-Square Tests And Related Opinions Are Flawed

26. No statistical analyses were carried out initially on tests commissioned by Defendants. Dr. Borth subsequently performed a series of chi-square tests of independence on the five previously discussed reports on ants, cockroaches and spiders (IV. B). Borth also examined a sixth report, but determined it was statistically "disqualified" (Borth Chi Sq. report at 30). Based on this analysis, Dr, Borth concluded: "Regardless of the experiment, pest, pest combination, the null hypothesis was rejected at the 5% and 10% level of significance for 124 of the 136 testing days (rejected 91% of the time). Therefore, I conclude that: Based upon the conditions in which the Pest Repellers were used in these five choice experiments and using the data reported in the associated research reports, the Pest Repellers can be classified as "efficacious" with a reasonable amount of certainty, given that efficacy is defined as the affectation of pest behavior such that there is a disproportionate number of pests found in an adjoining arena where there is no Pest Repeller." (Borth Report at 30).

27. Three different test designs were employed in the five studies analyzed by Dr. Borth: a 6-room test (QMANN REPORT # 10275-1); a 2-room test (QMANN REPORT # 10275-2); and three, 2-chamber tests (SGS Report # SZXWT00603439; Intertek Report # 140515021GZU-002; Intertek Report # 160419051GZU-002). For each experimental design, the following flaws were noted in the chi-square analysis.

1. 6-Room Test (QMANN REPORT # 10275-1):

28. If the B+H Pest Repeller had no effect, then the test organisms should distribute themselves evenly into all six rooms eventually. However, the statistical calculations presented by Dr. Borth were based on the assumption that test organisms should be equally divided into Room 3 (50%) and all other rooms (50%), but given that there were a total of six rooms, the expectations should be that 1 out of 6 test organisms would be in each room. When you adjust the statistical test to this more realistic assumption, you find that the level of statistical significance is not reached at any time. The experiment is flawed for lack of adequate numbers of test organisms, replication, untreated controls, etc. (12-17), and the results of this test were statistically insignificant.

2. 2-Room Test (QMANN REPORT # 10275-2):

29. In experiments involving two rooms or arenas that are subsequently analyzed using a chi-square test, investigators must design their areas to ensure that the two choices are equivalent. In QMANN REPORT # 10275-2 the two rooms are clearly not identical in area and other characteristics (e.g., presence of exit area) and thus the statistical analysis is invalid. Dr. Borth's chi-square analysis is further flawed in that it assumes results from consecutive days are independent of one another. Where an organism is on day 5, for example, could influence where it is on day 6, independent of any effect of the repeller (e.g., cockroaches continuing to remain in a room with fewer predatory spiders). Analyzing each day of each test as a separate experiment inflates the overall conclusion of Borth's chi-square analysis that there was a significant effect from the repeller on 124 out of 136 testing days. Dr. Borth's statistical analysis regarding this experiment was therefore invalid.

3. 2-Chamber Tests (SGS Report # SZXWT00603439; Intertek Report # 140515021GXU-002; Intertek Report # 160419051GZU-002):

30. As in paragraph 29, results on consecutive days of the 2-chamber tests are not independent of one another since potential bias is created by where the test organisms were the previous day. Therefore, they add little to support the overall conclusion of a significant effect of treatment. Moreover, summing data from different organisms (spiders, ants, cockroaches) that already were analyzed independently does not give additional weight to the results (Borth Report at 5, 9, 14, 19, 24, and 29). Dr. Borth's statistical analysis regarding this experiment was therefore similarly invalid.

31. Statistics alone cannot "rescue" a fundamentally flawed experiment. Credible researchers initially design their experiments with sufficient sample size, replication, untreated controls, and other considerations to answer the questions posed. They then strive to interpret the findings and put them into context. Clearly, this was not done in the design, conduct, and interpretation of tests commissioned by Defendants. Aside from the abovementioned flaws in Dr. Borth's chi-square analysis, the exercise is of negligible practical relevance to whether the Bell + Howell devices used as advertised drive pests out of homes and buildings.

D. Dr. Borth Neglected Multiple Published Studies Showing That Ultrasonic Technology Does Not Work

32. Dr. Borth opines that any scientist wanting to publish research on entomological topics, including efficacy of ultrasonic devices to repel pests, would publish in Entomological Society of America (ESA) journals (Borth Report at 8). That is entirely wrong. Entomologists publish their work in dozens of other reputable non-ESA journals, a number of which include additional studies on the efficacy of ultrasonic pest devices.

33. Therefore, Dr. Borth's conclusions that "there is no more recent journal publication of the effect of ultrasound on roaches, ants or spiders than those cited and referenced

in (his report)," and that there are only four such articles published on any date are completely wrong. Because Dr. Borth limited his search to ESA journals, he failed to discover the following peer-reviewed and industry trade publications referenced in my October 31, 2017 report:

- Ballard, J.B., and R.E. Gold. 1982. Ultrasonics: no effect on cockroach behavior. Pest Control. 50:24,26.
- Ballard, J.B., and R.E. Gold. 1983. The response of German cockroaches to sonic and ultrasonic sound. Journal of Kansas Entomological Society. 56: 93-96.
- Schreck, C.E., J.C. Webb, and G.S. Burden. 1984. Ultrasonic devices: evaluation of repellency to cockroaches and mosquitoes and measurement of sound output. Environmental Science and Health A, 9, 521-531.
- Huang, F., B. Subramanyam, and J. Clark. 2002. Laboratory and field trials with commercial ultrasonic devices against thee ant species (Hymenoptera: Formicidae). Journal of Agricultural and Urban Entomology. 19(1): 25-28.
- Subramanyam, B. 2003. Ultrasound and arthropod pest control: Hearing is Believing. http://www.grains.k-state.edu/spirel/docs/research/ultrasound-ipm/presentation/SCJ%20talk.pdf
- Warner, J. and R.H. Scheffrahn. 2005. Laboratory evaluation of baits, residual insecticides, and an ultrasonic device for control of white-footed ants, *Technomyrmex albipes* (Hymenoptera: Formicidae). Sociobiology 45(2): 1-14.
- Huang, F. and B. Subramanyam. 2006. Lack of repellency of three commercial ultrasonic devices to the German cockroach (Blattodea: Blattellidae). Insect Science. 13: 61-66.

- Ahmad, A., B. Subramanyam, and L. Zurek. 2007. Responses of mosquitoes and German cockroaches to ultrasound emitted from a random ultrasonic generating device. Entomologica Experimentalis Applicata. 123: 25-33.

34. Based on Dr. Borth's limited search for relevant literature, he opines that: "By inference, since B+H Ultrasonic Pest Repellers were not included in any of the published studies and that the quality of sound differs between devices, we cannot extrapolate from the published researchers' conclusions of efficacy or non-efficacy on other ultrasonic devices to any of the B+H Ultrasonic Pest Repellers, because they simply were not tested in the same published experiments" (Borth Report at 8).

35. Notwithstanding this opinion, Dr. Borth concludes that the Bell + Howell Repellers are effective in repelling pests relying on Ballard et al. (1984) because that study tested ultrasonic technology with a comparable frequency and loudness to the Bell + Howell Repellers (Opinions 3 and 4).

36. However, Dr. Borth fails to analyze the frequency and the loudness of the devices tested in any studies other than Ballard et al. (1984).

37. As I explained in Section IX of my October 31, 2017 report, seventeen studies examining the efficacy of ultrasonic devices with comparable frequency and amplitude to the Bell + Howell devices have confirmed that the technology is ineffective to repel cockroaches, ants, spiders, mice, and rats.

38. That includes the Koehler (1986) article. Dr. Borth states that he reviewed this study, but fails to mention that it examined nine ultrasonic devices with frequencies and amplitudes comparable to the Bell + Howell devices. Dr. Borth does not explain why he believes it inappropriate to draw conclusions about Bell + Howell devices from this study,

which conclusively showed no effectiveness of ultrasonics in repelling or controlling cockroaches.

E. Plaintiffs' Alleged Noncompliance With User Instructions Is Immaterial

39. Dr. Borth opines in his Report (pages 10-16) that Plaintiffs Joanne Hart and Sandra Bueno failed to follow instructions accompanying their Bell + Howell Ultrasonic Pest Repeller, and the "dereliction in their end-user obligation" prevented them from obtaining the desired result. Such assertions are immaterial to the ineffectiveness of these devices.

40. Most importantly, this is insignificant because, as I explained in my initial report, the Bell + Howell repellers are ineffective for their stated purpose. The repellers could not have worked for Plaintiffs regardless of whether or not they complied with user instructions.

41. Moreover, Dr. Borth's specific critiques are misleading.. One "obligation" noted by Dr. Borth was to "make sure that all food is put away, (since) the smell of food attracts pests and will decrease the efficiency of the Ultrasonic Pest Repeller." In the overall management of pests, it is always prudent to remove trash and food wastes; however, even clean households can sustain ants, cockroaches, spiders and rodents. Food debris hidden within, behind and beneath cabinets, shelves, stoves, refrigerators, dishwashers, and other hard to reach areas provide ample sustenance for pests. Warmth, moisture, and abundant harborage afford other necessities for pests to proliferate within dwellings. Also of little import is whether Plaintiffs installed the devices behind large items such as couches or hutches, since ultrasound is also unable to penetrate cabinets, appliances, walls, floors, ceilings, and other hidden areas where pests dwell.

Further assertions regarding failure to read or retain user instructions for future reference are also immaterial to the nonperformance of these products.

V. ANALYSIS OF WHITFORD REPORT

42. I also reviewed the expert report of Dr. Philip Whitford in this case. Dr. Whitford makes a finding that the Bell + Howell devices perform as advertised based upon (1) studies on the Bell + Howell devices commissioned by Defendants, and (2) studies he performed using "Transonic Pro sound producing devices." As explained below, the referenced studies are flawed and do not support Dr. Whitford's conclusions.

A. All B+H Rodent Tests, Including Those Conducted In 2011, 2014 And 2016, Are Flawed And Unreliable

43. Dr. Whitford asserts that the B+H Ultrasonic Pest Repellers were effective in repelling rats and mice in tests conducted in 2011 and 2014, whereas tests conducted in 2016 were adversely impacted by overcrowding within the test chambers. He further opines in his report that "The only valid criteria for efficacy for any pest repelling device is clear evidence that it causes a predictable change in behavior of the target animals when it is on versus when it is off. Ergo, the UPR units *performed as advertised in these cases*" (italics for emphasis). What is troubling about these conclusions is that they neglect to mention that none of the B+H devices were tested in the "real world" in a way that would demonstrate their ability to drive pests out of dwellings —the *actual* performance claim advertised by Defendants. Temporary movement of rodents from one small plastic interconnected cube to another is not the same as this.

44. Dr. Whitford grants that "all tests to mice and rats used extremely similar test apparatus of two 4 Ft. by 4 Ft. acrylic chambers connected to each other with clear acrylic tubes to permit mice or rats to move between chambers." There is broad scientific consensus that such tests do not predict performance of ultrasonic devices in real-world environments (Bomford and

O'Brien 1990; Shumake 1995). Significantly, Dr. Whitford, *himself*, cautioned against using artificial enclosures in his own prior studies with two other ultrasonic pest devices, Transonic PRO and Yard Guard™ :

> "Rather than use an unnatural lab based testing using plexiglass enclosures and confined mouse populations, I chose to use free natural populations of mice as in test designs previously used to test efficacy of sound devices against the Norway rat *Rattus norvegicus* (Ashton, 1999). I feel such real world tests on free populations produce far more valid results than artificial enclosure studies, based on my 35 years field experience doing research in natural settings as a PhD in ethology. Equipment efficacy is best tested in the natural environment for any species, for normal responses to novel stimuli are far more likely to be witnessed in such settings than in unfamiliar surroundings."[2]

45. Contrary to Dr. Whitford's assertion, several field studies have previously evaluated ultrasonic pest repellers with similar frequencies, amplitudes, and sound cycles as the Defendants' (Sprock et al. 1967; Meehan 1976; Lavoie and Glahn 1977; Fitzwater 1978; Beck and Stein 1979; Lund 1984; Shumake et al. 1982, 1984; Howard and Marsh 1985; Bomford and O'Brien 1990; Koehler et al. 1990). Virtually all of these independent investigations rejected ultrasonic technology as a practical means of rodent control, concluding the devices were unlikely to control, repel, or drive rats or mice out of homes or buildings. A similar lack of effectiveness resulted when Bell + Howell's own pest repellers were evaluated against mice in vacant apartments (Potter Report, October 31, 2017, Section VIII. C.).

46. Conversely, Dr. Whitford is *incorrect* in his assertion that "there are also dozens of studies that show the (sic) ultrasound can and does work when used correctly within the limits of its sound intensity and hearing frequency range of pests targeted." (Whitford Report, Summary Comments re: Amended Complaint Document). The only "evidence" he cites are two of his own studies where he "found Ultrasound to be extremely effective to dispel mice and bats

[2] Whitford, P.C. 2011. Transonic Pro and Yardguard sonic/ultrasonic units reduce mouse damage in home and garden. Poster, 14th Wildlife Damage Management Conference. Nebraska City, NE

from houses and barns and sheds." Flaws associated with these studies are discussed in Section V. B. of this rebuttal report.

47. Rodents often display aggressive, territorial behavior, especially in crowded and confined conditions. Dr. Whitford opined on such behaviors in his report, concluding that the Bell + Howell devices performed as advertised when 10 rats or mice were introduced into the test chambers (12/1/11 test - BHH, LLC 002509; 5/17/14 test - BHH, LLC 002565), but did not perform as advertised when 20 rats or mice were confined within the same enclosures (4/7/16 test - FEUERSTEIN 000086). He surmised that excessive crowding in the subsequent, 2016 trial altered the rodents' behavior and lessened their response to ultrasound.

48. Irrespective of whether the total number of rodents in these tests was 10, 15, or 20, confining this many rats or mice in such a small (4 x 4 foot) space devoid of harborage stressed and altered their behavior. This was evident by the mortality occurring in most trials, regardless of number of rodents introduced. For example: BHH, LLC 001750 (10 rats and mice introduced) – 2 dead rats, one dead mouse the day before device activation; BHH, LLC 002509 (10 rats and mice) – 2 dead rats before device activation; BHH, LLC 001508 (15 rats and mice) - 2 dead rats, 1 dead mouse before activation; BHH, LLC 001421 (15 rats and mice) – 3 dead rats, 2 dead mice before activation; BHH, LLC 002593 (20 rats and mice) – 1 dead rat, 1 dead mouse before activation; BHH, LLC 001531 (20 rats and mice) - 3 dead rats, 3 dead mice; FEUERSTEIN 000086 (20 rats and mice) – 9 dead rats, 3 before and 6 during activation; and 7 dead mice, 2 before and 5 during activation.

49. Besides the unnatural effects caused by overcrowding, it is odd that Dr. Whitford neglected to mention the many other flaws with the Bell + Howell tests on rodents. For example, (1) no replication, randomization, or inclusion of untreated controls (how can he surmise what

constitutes "normal conditions" without untreated controls?); (2) The practice of re-releasing rodents *after* the initial acclimation period and replacing dead rodents with non-acclimated individuals; (3) Using domesticated, white laboratory mice instead of wild mice; and (4) continued consumption of food and water on both repeller and non-repeller sides of enclosures suggesting sustained, back and forth movements, probably at night (Potter Report, October 31, 2017, Section X).

50. None of the Bell + Howell devices were evaluated in a way that would demonstrate the ability to "drive pests out!" of homes and buildings. Dwellings are far more complex environments than small, empty, interconnected plastic cubes. In real-world environments, rats and mice do not reside in open spaces, preferring instead to nest and forage in concealed locations. This creates fundamental problems for ultrasonic devices whose waves are directional and unable to bend around or penetrate objects. This results in untreated "sound shadows" on the other side (Wood, 1986, Bomford and O'Brien 1990, Corrigan 2001), and an inability to reach hidden areas within/beneath/behind cabinets, closets, furniture, appliances, stored items, floors, ceilings, etc. These are the very places rodents (and cockroaches, ants and spiders) hide within homes and buildings. Bell + Howell's own labeling acknowledges these limitations:

NOTE: Ultrasonic signals will lose intensity as it travels. It is also absorbed by soft objects such as carpeting and is reflected by hard surfaces, such as furniture. Ultrasonic signals cannot reach nesting or feeding places behind walls, under floors, or within cracks.

Consequently, it is immaterial whether Plaintiffs Sandra Bueno and Joane Hart complied with the seller's instructions about "not placing the ultrasonic devices behind obstructions, plugging

in the device 4 feet above floor level, or directing units sound toward probable entrance point of insects and such" (Whitford Report. Depositions of Bueno and Hart)[3]

51. Dr. Whitford's remarks about Plaintiffs Bueno and Hart failing to find and direct sound at probable/suspected points of insect and rodent entry are especially troubling, since these areas can be hard to diagnose, particularly by laypersons. Mice and rats may enter homes via gaps under garage or entrance doors, cracks in foundations, crawl space and dryer vents, openings around plumbing, electrical, or telephone lines, floor drains, attics, eaves, roofs, or chimney caps. Entry points for ants, spiders, and some cockroach species (e.g., American, Asian, Oriental, Smokybrown) may be even more subtle, while German cockroaches (the most common household variety) dwell entirely indoors and are less influenced by identifying/denying entry points.

52. As rodent infestations become established, they emit pheromones in their urine, droppings, and other secretions. Occurring in increasing amounts, the odors serve to attract and retain others of the same species. Since the Bell + Howell pest repellers are marketed to control existing infestations, they would need to overpower these aggregating odors in order to "drive pests out" of buildings. The plastic test chambers used by Defendants lacked suitable harborage that would have enabled pests to congregate and concentrate such odors. Non-permeable substrates such as plastic are also less favored for deposition of pheromones. Porous materials (wood, cardboard, fabric, sheetrock, masonry, etc.) are more natural and preferred by rodents.

[3] No mention of needing to install devices at a specific room height, or directing the sound toward probable pest entrance points could be found anywhere in Bell + Howell's user instructions, despite each being cited by Whitford as evidence of noncompliance.

53. In his report, Dr. Whitford references his training and experience as an animal behaviorist. In view of this background, I am perplexed that he all but discounts the issue of habituation to ultrasonic pest repellers, a phenomenon recognized even by the Defendants:

> **"In some cases, over time, certain rodents may become accustom (sic) to ultrasonic signals. Some may return to their feeding or nesting areas even in the presence of an ultrasonic product."**

Habituation of rats and mice to ultrasound has been shown repeatedly in scientific research and practical application (Potter Report, October 31, 2017, Section IX. D). While in some instances rats or mice were repelled from the immediate area of sound for a brief period, they soon returned and resumed normal activities, typically within hours, days, or a few weeks depending on conditions (Shumake et al. 1982; Bomford and O'Brien 1990; Corrigan 2001). As part of a U.S. EPA investigation and enforcement action, rodentologist S.A. Shumake evaluated six ultrasonic pest repellers with similar output characteristics as the Bell + Howell devices. In a series of field trials involving rats and mice, the investigators observed only occasional, temporary repellent effects and concluded: "Despite the wide range of decibel levels and frequencies evaluated, strong, sustained repellent effects were never detected. The six devices had insufficient repellency to merit any usefulness in rodent pest control applications, preventive or corrective" (Shumake 1984, 1995). Two other respected rodentologists, W.E. Howard and R.E. Marsh (Univ. Calif. Davis), began evaluating effects of ultrasound on rodents in the late-1950s. In a review 30 years later, they concluded: "It is well established that (ultrasonic) devices will not exterminate, kill, or drive rodents out of a favorable habitat. At best, they may temporarily discourage rodents from visiting areas in buildings that have little cover available. Most rats and other rodents quickly become accustomed to any new sound, especially after it has

been repeated long enough. Consequently, rats and mice can be found living in grain mills, machine shops, around airports, along major highways, and many other places where the sound frequencies and levels of intensity are highly varied and complex" (Howard and Marsh 1985). Rodent scientists with the Danish Pest Infestation Laboratory Ministry of Agriculture evaluated 11 different ultrasonic repellers with emissions similar to those marketed by Defendants against Norway rats. The investigators deemed the experimental design "most favorable from the producer's (manufacturer's) viewpoint" since it involved relatively small, 14 x 14-foot interconnected rooms provisioned with food, water and nesting material, but no obstacles to create sound shadows. One of the rooms had a device pointing directly at the feeding tray, while the other room did not. Although some rats were disturbed initially, they became accustomed within 3 hours of switching on the device and showed no signs of repellency for the remaining 7 days of the experiment. The researchers concluded that the findings "strongly indicate that a practical effect in a warehouse, stable, store room, or almost any other building is out of the question" (Lund 1984, 1988). Rentokil, the largest pest control company in Europe, evaluated 20 different ultrasonic devices with varying outputs against rats and mice in indoor and outdoor experimental situations as well as in practical field trials. The investigators concluded, "None of the units produced anything more than a partial repellency for a day or so which was overcome, regardless of whether the frequency was variable, random, or intermittent" (Meehan 1984). Initial indications of avoidance were also observed when Bell + Howell's own repellers were recently evaluated against mice in vacant apartments; however, after one week the mice had resumed normal activity (Potter Report, October 31, 2017, Section VIII. C-D).

B. Dr. Whitford's Testing Of Transonic Pro Is Flawed And Unreliable

54. In his summary comments (re: amended complaint document), Dr. Whitford asserts that "ultrasound can and does work when used correctly…" As evidence, he relies on two

studies he conducted with a sonic/ultrasonic device known as Transonic Pro (Bird-X, Chicago, IL).[4] Narratives on both studies, one on mice, another involving bats, were appended to his report. Whitford concluded the device "showed a strong level of efficacy" and that the studies "found Ultrasound to be extremely effective to dispel mice and bats from houses and barns and sheds." In reviewing the study performed on mice (*Transonic Pro and YardGard Sonic/Ultrasonic Units Reduce Mouse Damage in Home and Garden*), I found the findings flawed and unreliable.

55. Dr. Whitford conducted the mouse study in his old (1870s) family farmhouse in central Wisconsin. Mice regularly entered the house from the basement, climbing the basement stairs, traversing a rear hallway, and entering the main rooms via an inner entry door with a gap underneath. One Transonic Pro device was placed in the narrow (1 x 3 meter) rear hallway, which was deemed to be the primary conduit for mice entering the main house. Dr. Whitford reasoned that placing the device in the hall "forced mice to pass within less than 1 meter of the sound generated to gain entry to the main house, thus exposing them to the full 96 dB sound at .5m." He then counted the number of mice caught in snap traps on the topmost stairs leading up from the basement and mouse droppings observed on kitchen counters in successive years—Aug. 5 to Dec. 5 2009 with the Transonic Pro turned on, versus Aug. 5 to Dec. 5 2010 with the device turned off. (Whitford also recorded mouse activity with the device turned on from Nov. 2012 to Nov. 2013, but with no subsequent period of deactivation.) Overall, Dr. Whitford observed very few mice in his house while the Transonic Pro was operational, versus many when it was not. Opining on the results, he concluded: "There is little question that any prior research

[4] According to the manufacturer's website, the Transonic Pro combines both sonic (audible) and ultrasonic (silent-to-most-humans) sound waves with an output of 3-40 kHz and 96 dB at 0.5 meters. Since it emits both sonic and ultrasonic sound, it cannot be directly compared with Bell+Howell's ultrasonic pest repellers.

on the use of ultrasound to repel mice which concluded it to be 'ineffectual or only partially effective' was incorrect in those conclusions based on the unambiguous results in this study."

56. The 'currency' of most scientific research is peer-reviewed publications. Credible research not published in peer-reviewed journals should at least hold up to scientific scrutiny, which this study clearly does not. According to Whitford's curriculum vitae, he never published his mouse study in any peer or non-peer reviewed journal; the findings were communicated in a poster at a 2011 Wildlife Damage Management Conference. Posters at scientific and professional meetings are sometimes used to convey preliminary research prior to publication, or to present information less suited for publication. Some scientific and professional meetings (including the one where Dr. Whitford presented his mouse study), encourage participants to publish their work in conference proceedings, which Dr. Whitford apparently chose not to do.

57. Dr. Whitford's mouse study with the Transonic Pro would be more aptly characterized as uncontrolled, non-replicated field observations. While such observations may help determine whether a device merits further evaluation, they are no substitute for controlled, replicated experiments. In time-sequence trials such as this one, 'before' is not a control on 'after' because treatment is confounded with time (Ingram 1977; Bomford and O'Brien 1990). Untreated control sites should be monitored concurrently with treated sites; otherwise, differences like those observed in this study could have been due to non-treatment factors, in particular, natural yearly fluctuations in rodent abundance.

58. Based on records maintained over 25 years, more than 99% of the rodents Dr. Whitford captured in his house (study site) were white-footed mice, *Peromyscus leucopus.*[5] Populations of this rodent species vary seasonally and year-to-year depending on weather, food

[5] Whitford incorrectly refers to *Peromyscus leucopus* as the "White-footed Deer Mouse." *P. leucopus* (the white-footed mouse) and *P. maniculatus* (the deer mouse) are in fact two different species. This may

availability, habitat modification, predation, inter and intra-species competition, etc. (Ostfeld et al. 1996; Myers et al. 2005). Dr. Whitford in fact acknowledges natural fluctuations of *P. leucopus* populations in the 'Research Site' section of his paper: "Mouse numbers vary seasonally and year to year, based on food supply, habitat and weather." In Wisconsin and other northern areas of its range, harsh winters can greatly deplete overwintering populations of this species, resulting in much smaller numbers the remainder of the year (Long 1996; Wolff 1996; Myers et al. 2005). Although Dr. Whitford discounts weather as a variable between 2009 (repeller on) and 2010 (repeller off), this may not be the case. Historical weather data for Marquette Co., Wis.[6] (where the study took place) indicate temperatures in Feb. 2009 and 2010 were indeed comparable. However, temperatures in Jan. 2009 were (unseasonably) colder than in Jan. 2010. In 2009, the average monthly high was 19°F, with an average low of minus 3°F (lowest minimum temperature minus 26°F). In 2010, the average monthly high was 25°F with an average low of 8°F (lowest minimum temperature minus 9°F) — a difference in temperature between years of 6°F average high and 11°F average low. For reference, normal high-low average January temperatures for this area are 26°F and 8°F — comparable to 2010, but considerably warmer than 2009. January 2009 was so cold it ranked as the coldest January since 1994, with extreme wind chill values down to -30°F to -45°F.[7] Considering the extreme effect severe winters can have on white-footed mouse populations later in the year, numbers may have

be more than academic since *P. leucopus*, the predominant species in his study, is more likely to be impacted by harsh winters.

[6] https://www.usclimatedata.com/climate/montello/wisconsin/united-states/uswi0463/2009/1

[7] http://www.crh.noaa.gov/Image/mkx/pdf/news/TopWxEvents2009.pdf

been intrinsically lower in 2009 (while the device was on), than in 2010 (when the device was off). Thus, fewer mice entering in the house while the device was operational could simply have been a result of fewer mice outdoors in nature. Other factors unrelated to treatment that could have affected results in 2009 versus 2010 include changes to the study site or surrounding areas (mowing/landscaping, debris removal, loss of habitat, construction, human activities, etc.). White-footed mice are efficient dispersers and colonizers; in the Great Lakes region, they are capable of expanding their range more than nine miles per year (Myers et al 2009). While alterations in habitat may not have occurred to the farmhouse itself, modifications farther 'afield' could have resulted in a greater abundance of mice the year the Transonic Pro was deactivated.

59. Besides the flawed test design, the way in which Dr. Whitford used the Transonic Pro was markedly different from user instructions accompanying Bell + Howell's pest repellers. Whitford positioned the device in a narrow hallway determined to be the primary entryway for mice into his home— thus, the device was used preventatively to deter rodents entering at a specific location. Conversely, Bell + Howell advertises using their products remedially: "Just plug it in (and) drive pests out" of your home, office or building. Moreover, Dr. Whitford concedes his manner of use may have been an atypical situation: "Placement of the unit in the house, where mice had to pass it to enter the kitchen and other main areas, may have been fortuitous, in that it exposed the mice to the greatest sound pressure level for the frequency used." Dr. Whitford is also a self-described "obsessive compulsive biologist." He lived in the farmhouse (his study site) since 1955 and "kept marginally complete 25 year records of small mammals caught or killed there." It is unrealistic to expect consumers with no expertise or experience to duplicate Whitford's experimental approach, particularly in larger, more complex dwellings. As noted previously (49), mice can enter homes and buildings in numerous ways.

Considering their innate limitations, strategically positioning an ultrasonic device to intercept all potential routes of rodent entry (garage/entry doors, foundations, vents, utility openings, attic, roof, eaves, etc.) would be extremely difficult, and certainly not what the public assumes when purchasing these products.

APPENDIX 1

REFERENCE CITATIONS

Ahmad, A., B. Subramanyam, and L. Zurek. 2007. Responses of mosquitoes and German cockroaches to ultrasound emitted from a random ultrasonic generating device. Entomologica Experimentalis Applicata. 123: 25-33.

Ballard, J.B., and R.E. Gold. 1982. Ultrasonics: no effect on cockroach behavior. Pest Control. 50:24,26.

Ballard, J.B., R.E. Gold, and T.N. Decker. 1984. Response of German cockroach (Orthoptera: Blattellidae) populations to frequency sweeping ultrasound-emitting device. Journal of Economic Entomology. 77: 976-979.

Ballard, J.B., and R.E. Gold. 1983. The response of German cockroaches to sonic and ultrasonic sound. Journal of Kansas Entomological Society. 56: 93-96.

Beck, J.R. and H.S. Stein. 1979. Rationale for testing vertebrate pesticides and devices in actual field situations. In Vertebrate Pest Control and Management Materials. (J.R. Beck ed.) pp. 289-293. ASTM Spec. Tech. Pub. 680, Philadelphia, PA.

Bomford, M. and P.H. O'Brien. 1990. Sonic deterrents in animal damage control: a review of device tests and effectiveness. Wildlife Society Bulletin. 18: 411-422.

Corrigan, R.C. 2001. *Rodent Control: A Practical Guide for Pest Management Professionals*. 355pp. Cleveland, OH.

Decker, T.N., T.A. Jones and R.E. Gold. 1989. Auditory thresholds in the American cockroach (Orthoptera: Blattidae): estimates using single–unit and compound-action potential recordings. Journal of Economic Entomology. 82: 687-691.

Foelix, R.F. 2011. *Biology of Spiders*. 419pp. Oxford University Press.

Fitzwater, W.D. 1978. Electromagnetic repellers—fact or fiction? In *Proceedings of the 8th Vertebrate Pest Conference*. 88-92. Lincoln, NE.

Gold, R.E. 1995. Alternative control strategies. In *Understanding and Controlling the German Cockroach*. (Rust, Owens, Reierson ed.). pp. 325-343. New York.

Gold, R.E., T.N. Decker and A.D. Vance. 1984. Acoustical characterization and efficacy evaluation of ultrasonic pest control devices marketed for control of German cockroaches (Orthoptera: Blattellidae). Journal of Economic Entomology. 77: 1057-1052

Howard, W.E. and R.E. Marsh. 1985. Ultrasonics and electromagnetic control of rodents. Acta Zool. Fennica 173: 187-189.

Huang, F. and B. Subramanyam. 2006. Lack of repellency of three commercial ultrasonic devices to the German cockroach (Blattodea: Blattellidae). Insect Science. 13: 61-66.

Huang, F., B. Subramanyam and J. Clark. 2002. Laboratory and field trials with commercial ultrasonic devices against thee ant species (Hymenoptera: Formicidae). Journal of Agricultural and Urban Entomology. 19(1): 25-28.

Ingram, C.R. 1977. Efficacy experiments involving avian pest control materials: design considerations imposed by the scientific method. pp. 215-224 *in* W.B. Jackson & R.E. Marsh, eds. Test methods for vertebrate pest control and management materials. ASTM Spec. Tech. Publ. 625, Philadelphia, Pa.

Koehler, P.G., R.S. Patterson, and J.C. Webb. 1986. Efficacy of ultrasound for German cockroach (Blattella germanica) (Orthoptera: Blattellidae)and oriental rat flea (Xenopsylla cheopis) (Siphonaptera: Pulicidae) control. Journal of Economic Entomology. 79: 1027-1031.

Koehler, A.E., R.E. Marsh, and T.P. Salmon. 1990. Frightening methods and devices/stimuli to prevent mammal damage – a review. In *Proceedings of the 14th Vertebrate Pest Conference*. 168-173. Lincoln, NE.

Lavoie, G.K. and J.F. Glahn. 1977. Ultrasound as a deterrent to *Rattus norvegicus*. Journal of Stored Product Research. 13: 23-28.

Long, C.A. 1996. Ecological replacement of the deer mouse, *Peromyscus maniculatus* buy the white-footed mouse, *P. leucopus*, in the Great Lakes Region. Canadian Field-Naturalist 110:271-277.

Lund, M. 1984. Ultrasound disputed. Pest Control. 52(12): 16.

Lund, M. 1988. Ultrasound devices. PP 407-409 in: Rodent Pest Management.

Meehan, A.P. 1976. Attempts to influence the feeding behavior of brown rats using ultrasonic noise generators. International Pest Control. 18: 12-15.

Meehan, A.P. 1984. *Rats and Mice: Their Biology and Control.* Rentokil Library Series. 383pp

Myers, P., B.L. Lundrigan, and B. Vande Kopple. 2005. Climate change and the distribution of *Peromyscus* in Michigan: is global warming already having an impact? pp. 101-125. In E.A. Lacey and P. Myers, eds. Mammalian Diversification: from Chromosomes to Phylogeography. Univ. CA Publ. in Zoology.

Myers, P., B.L. Lundrigan, S.M.G. Hoffman, A.P. Haraminac and S.H. Seto. 2009. Climate-induced changes in the small mammal communities of the Northern Great Lakes Region. Glob. Change Biol. 15: 1434-1454.

Ostfeld, R.S., M.C. Miller, and K.R. Hazler. 1996. Causes and consequences of tick (*Ixodes scapularis*) burdens on white-footed mice (*Peromyscus leucopus*). Journal of Mammalogy. 77(1): 266-273.

Schreck, C.E., J.C. Webb, and G.S. Burden. 1984. Ultrasonic devices: evaluation of repellency to cockroaches and mosquitoes and measurement of sound output. Environmental Science and Health A, 9, 521-531.

Shumake, S.A., A.L. Kolz, K.A. Crane and R.E. Johnson. 1982. Variables affecting ultrasound repelling in Philippine rats. Journal of Wildlife Management. 46: 148-155.

Shumake, S.A., G.K. LaVoie, and K. Crane. 1984. Efficacy test protocols for evaluation of ultrasonic rodent repellent devices. In *Proceedings of the 11th Vertebrate Pest Conference*. 85-88. Lincoln, NE.

Shumake, S.A. 1995. Electronic rodent repellent devices: a review of efficacy test protocols and regulatory actions. In *Repellents in Wildlife Management*. pp 253-270. USDA. Ft. Collins, CO.

Sprock, W.L., W.E. Howard, and F.C. Jacob. 1967. Sounds as a deterrent to rats and mice. Journal of Wildlife Management. 31: 729-741.

Subramanyam, B. 2003. Ultrasound and arthropod pest control: Hearing is Believing. http://www.grains.k-state.edu/spirel/docs/research/ultrasound- ipm/presentation/SCJ%20talk.pdf

Transonic Pro. https://bird-x.com/bird-products/electronic/sonic/transonic-pro/ (accessed 12/4/17)

Warner, J. and R.H. Scheffrahn. 2005. Laboratory evaluation of baits, residual insecticides, and an ultrasonic device for control of white-footed ants, *Technomyrmex albipes* (Hymenoptera: Formicidae). Sociobiology 45(2): 1-14.

Whitford, P.C. 2011. Transonic Pro and Yardguard sonic/ultrasonic units reduce mouse damage in home and garden. Poster, 14th Wildlife Damage Management Conference. Nebraska City, NE

Wolff, J.O. 1996. Coexistence of white-footed mice and deer mice may be mediated by fluctuating environmental conditions. Oecologia 108: 529-533.

Wood, F.E. 1986. Nonpesticidal components essential to pest management. pp.129-162. In *Advances in Urban Pest Management*. (G.W. Bennett and J.M. Owns ed.). N.Y, N.Y.

VERIFICATION

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge, information, and belief, and that this declaration was executed at Lexington, Kentucky, this 22nd day of December, 2017.

Michael F. Potter